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New Southern Pine Beetle Outbreaks Reported

The southern pine beetle is once again rearing its head in several locations throughout the South. By August 1 outbreaks had been reported in Alabama, Arkansas, Georgia, Louisiana, Mississippi, South Carolina, and Texas.

Infestations have ranged from one tree to 15-20 acres of green infested trees. Indications are that activity will continue through 1982 and may increase next year. Initial activity was detected in areas which have had a previous history of SPB. In Texas, early infestations oc-

curred in stands which had been classed as high hazard (stands with large trees, high basal area/acre, poor drainage), although spots occasionally appeared in low and moderate hazard areas with logging damage or lightning-struck trees.

Suppression efforts have been initiated in most locations. Because of poor market conditions, more emphasis is being given to such control options as cut-and-leave and, in a few instances, pile-and-burn rather than salvage.

SPB Status as of August 1, 1982

State	Private Lands	National Forest Districts
Alabama	Clarke County	None
Arkansas	Montgomery County	Caddo, Mena
Georgia	Catoosa, Clarke, Cobb, Elbert, Greene, Hall, Madison, and Monroe Counties	Oconee
Louisiana	Allen, East Baton Rouge, East and West Feliciana, Evangeline, and St. Tammany Parishes	Catahoula, Evangeline
Mississippi	Adams, Amite, Copiah, Franklin, Jefferson, and Wilkinson Counties	Bude, Homochitto
S. Carolina	Fairfield, Lexington, Newberry, Oconee, and Richland Counties	None
Texas	Hardin, Sabine, St. Augustine, and Tyler Counties	Angelina, Yellowpine

SPB Survey Made In Texas

Pest Control personnel recently made a reconnaissance flight over selected areas of Angelina, Tyler, Polk, Hardin, Liberty, and Houston Counties (including portions of the Angelina and Davy Crockett National Forests) to observe southern pine beetle activity. No multiple-tree spots were seen.

Traps baited with SPB pheromone have been set out in 20 locations in Polk, Tyler, and Hardin Counties. These traps are being monitored weekly for SPB and the clerid predator, *Thanasimus dubius*. To date, a few southern pine beetles have been captured in one trap

located in Tyler County. In the same trap, 20-30 clerid beetles have been collected for each SPB. Early research by Dr. J. P. Vité in east Texas suggested that the ratio of SPB to clerids can be used as an indicator of pending outbreaks. As outbreak conditions developed in the early 1970's, the ratio of SPB/clerids switched in favor of SPB.

If the same relationship holds true for current trapping results, it is apparent that SPB will remain at an endemic level. However, other conditions, (e.g., conditions during the spring) may favor a SPB population buildup. Monitoring with aerial surveys and pheromone traps will continue to keep abreast of the situation.

Integrated Pest Management Slide/Tape Being Prepared

Bill Hoffard, Entomologist, and Robert Anderson, Pathologist, with Forest Pest Management in Asheville, NC, are developing a slide/tape program on Integrated Pest Management of Forest Pests. The program considers developmental stages within the life of a forest, the pests which affect each stage, and interactions between pests which should be considered when making forest management or pest control decisions. The completed slide/tape should be available for distribution in December. For additional information, contact Ken Swain, FPM, S&PF, 1720 Peachtree Rd., NW, Atlanta, GA 30367.

Technology Implemented on Holly Springs NF

A project, "Integrated pest management on National Forests: Demonstration project on the Holly Springs NF in Mississippi," has been implemented by the Southeastern Area, S&PF, with support from the IPM Program.

The objective will be to incorporate the latest southern pine beetle and tree disease management technology into the Holly Springs Ranger District's management guidelines and practices. Alexandria Field Office FPM investigators Mike Connor, Dale Starkey, and Wes Nettleton will work with Timber Management Assistant Steve Weaver and computer specialist Bob Uhler to set up and carry out the project. They will collect SPB spot data and suppression information using a simplified version of the SPBIS system, determine the priority for control based on SPBIS information, hazard rate the District for annosus root rot and SPB using available CISC data and soils maps, utilize the IPM Decision Key for management decisions, and analyze the economic benefits from using the new technology.

Two New SPB Facts Sheets Available

Two new Southern pine beetle fact sheets have been released by Southeastern Area State and Private Forestry and are available upon request.

SPB fact sheet No. 24 is entitled "Buffer Strip" and No. 25 is entitled "Utilization of Beetle-killed Southern Pine Based on Tree Appearance." To obtain a copy, write to: Southeastern Area State and Private Forestry, 1720 Peachtree Road, NW, Atlanta, GA 30367. Please remember to refer to the fact sheet by number when requesting.

FERRET: The Question Analysis Routine for the Southern Pine Beetle Decision Support System

Among the products of the Expanded Southern Pine Beetle Research and Applications Program (ESPBRAP) and the present Integrated Pest Management for Bark Beetles of Southern Pines Program have been a series of computer-based, mathematical models which abstract research findings in the areas of beetle population dynamics, stand growth and yield, stand hazard rating, beetle-killed timber utilization, and economic impact evaluation. The IPM Bark Beetle Program has funded a project at Texas A&M University to develop an operational, computer-based decision support system for southern pine beetle management which will provide users with access to this new technology.

Among the problems faced by the developers of this decision support system has been the realization that user-perceived questions and problems relative to SPB management are many and varied. Thus, information processing is not prespecifiable, and problem solving has to be on an *ad hoc* basis. The solution to this problem has been the development of an information cataloging system called FERRET. FERRET is a computer-based, question analysis system that allows a user to identify the types of model technology that are available to aid him in his decision making process.

The system works as follows: The user's question is typed into the computer and displayed. The program then offers a series of menus relative to that question. From each menu, the user is asked to indicate the category in which he feels his question falls. The process is repeated until the program has enough information about the question to identify the model(s) that are available to aid in solving it.

The program then offers the user the opportunity to see a narrative description of any model(s) that have been identified as being of potential assistance in answering his question. A narrative will include a description of a model and the purposes for which it was developed, any limitations and qualifications on its use, and where and how the model can be accessed. The user can also choose to see input and output listings for a model, which will allow him to assess the data requirements for and information derived from it.

Twenty computerized models are presently incorporated and indexed in FERRET: Hazard rating models (3), economics or impact evaluation models (5), stand growth and yield models (7), population dynamics models (4), and utilization model (1).

The program for FERRET is written in an interactive format. All program controls are made in response to prompts and questions presented on the computer

screen. A help routine has been incorporated in the program. This routine describes all operating procedures and provides a glossary of terms used in the program's structure. FERRET has been programmed in FORTRAN Basic, with no extensions. The program can be established on any mainframe-type computer system with a time sharing (interactive) option. A developmental version of the program designed for use with the TEKTRONIX 4052 microcomputer is also available for use.

Anyone interested in obtaining the computer code for FERRET or accessing an established version of the program should contact Dr. Robert N. Coulson, Department of Entomology, Texas A&M University, College Station, TX 77843.

Effort Mounted to Link Bark Beetles and Host Systems

Funded investigators and several interested scientists from southern universities and the Forest Service, as well as several experts from western universities, met at Stephen F. Austin State University, Nacogdoches, recently.

Discussions centered around general research direction and needs in the host/insect interactions area, looking at alternative approaches that have or could be used in the South, and obtaining ideas on relative priorities for new or continuing work.

Information derived from the meeting will be used by Program management in planning and funding additional work to begin in FY 1983. Attention will focus on:

1. Developing technique(s) for measuring and describing individual tree vigor.
2. Determining attack thresholds for various susceptibility classes.
3. Classifying stand vigor.
4. Determining differences in host susceptibility related to the various bark beetle species.
5. Determining the effects of natural- and man-caused disturbance on host-susceptibility.
6. Prediction of outbreak occurrence based on host/environmental/insect interrelationships.

Evan Nebeker, leader of the new Host/Insect Interactions Working Group, Mississippi State University, moderated the meeting. Attendees included Fred Hain and Karen Wilson (N.C. State Univ.), Tom Miller and Roger Belanger (Southeast. For. Expt. Stn.), John Hodges, Mark Brown and Catolino Blanche (Miss. State Univ.), Bob Bridges (South. For. Expt. Stn.), Fred Stephen and Tim Paine (Univ. Ark.), Bob Coulson, Tom Payne and Peter Sharpe (Tex. A&M Univ.), Rex Cates (Univ. N. Mex.), Gary Pitman (Ore. State Univ.), Alan Berryman (Wash. State Univ.) and Garland Mason and Bob Thatcher (South. For. Expt. Stn.-IPM Program).

Based on this meeting and further interaction with the Working Group, a game plan for researching the critical areas of host/insect interactions will be developed and research implemented in the near future.

North Carolina Projects Visited by IPM Program Team

An onsite visit was made recently to North Carolina State University in Raleigh. Two complementary projects dealing with interactions of the southern pine beetle, *Ips* species, and the host tree under endemic conditions and prediction of changes from endemic to epidemic conditions on a wide-area basis were discussed with Dr. Fred Hain and his associates.

During 1982, physical and chemical characteristics of trees are being measured in an effort to characterize tree vigor and host susceptibility. Tree tents will be placed around preselected trees and SPB introduced to determine the number of beetles required to successfully attack trees of known vigor. These results should ultimately permit us to relate environmental and stress factors to host susceptibility and SPB sample estimates to likelihood of attack success.

Prediction techniques have been developed for estimating numbers of SPB spots at the county level for North Carolina and are being utilized by the State's Forest Service to plan surveillance and prediction surveys. Continuing research will relate these results to stands and trees. A similar prediction system has been completed and is being evaluated in Georgia in cooperation with the Georgia Forestry Commission and plans are being made to extend the work to Texas.

Those participating in the visit included Fred Hain, Karen Wilson, and Bill Mawby (NC State, Dept. of Entomology), Harvey Gold (NC State, Dept. of Biomathematics), Coleman Doggett (NC Forest Service), and Bob Thatcher and Garland Mason (IPM Program).

Creosote Production From Beetle-Killed Wood

Georgia Forest Research Paper No. 25, "Creosote production from beetle infested timber," was published by the Georgia Forestry Commission earlier this year. The creosote produced by beetle-killed wood (10-12 months after attack) was compared with green pine, green hardwood, and seasoned hardwood (oak/hickory) in airtight woodburning stoves.

All woods tested produced significant amounts of creosote accumulation. Beetle-killed wood was > seasoned hardwood > green hardwood > green pine. However, all produced significant amounts of creosote. It was concluded that beetle-killed wood should not be rejected as a fuel wood on the basis of creosote production.

For additional information, contact Mr. J. Fred Allen, Wood Energy Specialist, Georgia Forestry Commission, P.O. Box 819, Macon, GA 31298.

New Pine Beetle Brochure Available

A new handbook entitled "Southern Pine Beetle: Field Guide for Hazard Rating, Prevention and Control," has been published by the Texas Forest Service.

This pocket-sized guide summarizes current recommendations for prevention and control of the southern pine beetle, the most destructive pest of pines in the South. Written by Dr. Ronald F. Billings and Charles M. Bryant of the TFS Forest Pest Control Section and published in cooperation with the USDA Forest Service, Southeastern Area State and Private Forestry, the handbook is designed for use by foresters, tree farmers and non-industrial forest landowners in East Texas.

Research has shown that pine stands, depending on their age, density and vigor, differ greatly in their susceptibility to attack by the southern pine beetle (SPB). This handbook explains how landowners can rate their own pine stands to determine the likelihood that beetle problems will develop. It also summarizes how to manage pine stands to avoid beetle infestations, how to recognize SPB attacks, and how and when to apply direct control measures.

The southern pine beetle has not been a problem in Texas since the last outbreak subsided in 1978. But beetle populations tend to be cyclic and beetle infestations are likely to return when conditions again become favorable. Meanwhile, forest managers can minimize future losses to the beetle by taking action now to identify those pine stands most prone to beetle attack. Periodic thinning of young pine stands to promote vigorous tree growth and harvesting older pine stands before they become overmature are two beetle prevention methods recommended in the handbook.

Forest landowners interested in receiving a free copy of this color-illustrated instruction booklet should write or call the Forest Pest Control Section, Texas Forest Service, P.O. Box 310, Lufkin, TX 75901 (Phone: A/C 713/632-7761), or contact their nearest Texas Forest Service office.

IPM Technical Meeting Planning Underway — And Not A Minute Too Soon

Preliminary plans are being developed for an Integrated Pest (disease, insect, vegetation, and animal) Management Technical Conference to be held in Athens, Georgia, June 19–21, 1984. Yes, you read right! 1984!

The planning group felt that in order to put on the best possible program, we needed this kind of lead time. Plans call for discussing each pest complex separately for each management unit (nurseries, seed orchards, stands) and having a summary paper which describes the interaction among all these pests.

The approach to take, meeting time and location,

target audience, and meeting products were discussed at a recent meeting at the Atlanta Airport.

Planning team members attending included:

D. H. Gjerstad, Department of Forestry, Auburn Univ.; P. P. Feret, Department of Forestry, Va. Polytech. Instit. & State Univ.; C. H. Fitzgerald, School of Forest Resources, Univ. Georgia; R. O. Fitzgerald, Silviculture Group, National Forests, Region 8; M. F. Hamm, Tenn. River Pulp and Paper; R. L. Hedden, College of Forest & Recreation Resources, Clemson Univ.

G. D. Hertel, IPM Program, Southern Forest Experiment Station; W. D. Kelley, Department of Forestry, Auburn Univ.; T. H. Miller, IPM Project, Southeast. Forest Exp. Stn.; J. E. Mocha, Southern Woodlands, Westvaco; H. V. Toko, Forest Pest Management, State & Private Forestry; H. O. Yates III, Cone and Seed Insect Project, Southeast. For. Exp. Stn.

Other members of the team include: E. L. Barnard, Florida Division of Forestry; C. W. Lantz, Cooperative Forestry, State & Private Forestry; T. A. Terry, Weyerhaeuser Company.

Updates on plans for the Technical Conference will be provided in future newsletters.

States Selected for Study on Federal Crop Insurance for Timber

Five southern States have been selected to participate in a pilot study involving federal crop insurance for timber. The States are: Georgia, North Carolina, South Carolina, Alabama, and Florida. Several counties within each State were chosen for the study.

The expansion of the 1980 Federal Crop Insurance Act includes timber as an insured crop. Such insurance covers the loss of timber due to unavoidable causes, including flood, frost, fire, excessive rain, insect infestation, plant disease, hail and hurricane.

A sample insurance policy has been prepared for the study with inputs from the five States. Under this pilot study, the Federal Crop Insurance Commission (FCIC) will provide crop insurance to producers in the counties based on personalized rates and with guarantees determined from the producer's actual yield history. A contract with the Southeastern Forest Experiment Station to obtain computer information from the Resources Evaluation Survey has been arranged. This data will be analyzed by the FCIC to develop actuarial tables. At the end of the pilot program, the Commission will evaluate the study, and submit its evaluation and recommendations to various Congressional Committees; their goal is to implement the program on a national basis.

The pilot study in the sample counties is scheduled to begin in 1983.

For additional information, contact Forest Pest Management, Southeastern Area State and Private Forestry, 1720 Peachtree Rd., NW, Atlanta, GA 30367 (Telephone 404/881-2961).

Program Considers Tree Diseases

Bark beetle control projects in the South have traditionally been directed at reducing losses caused by the southern pine beetle. More and more we realize that, though SPB is the most damaging of the southern bark beetles, they do not act entirely on their own. The other bark beetles and several tree diseases play an important role in favoring or regulating activity of the southern pine beetle. A primary goal of the IPM Program is to consider the primary pest complex (insects and diseases) of the southern pines and to develop a better understanding of how each organism relates to the other and to forest management in general.

Forest disease research is conducted through many industrial, Federal, university, and State research programs. Thus, the IPM Program does not plan to conduct research directly on forest pathogens, but rather focus on the role they play in predisposing trees to attack by bark beetles, or on bark beetle control programs as they influence the incidence and severity of tree diseases and the effectiveness of control.

A "how-to" handbook describing annosus root rot, fusiform rust, and littleleaf disease, interactions among these diseases, and their integrated relationship with the host and pine bark beetles will be available for distribution soon.

The role of tree diseases in predisposing trees and stands to attack by bark beetles has been described in a complete literature analysis on host susceptibility to bark beetles being completed by researchers at Mississippi State University. Greater insight into the interrelationships among insects, diseases and forest management is being gained through interviews and on-the-ground inspections of operational harvesting and thinning operations by an interdisciplinary research team from the University. This report should reveal practices which result in increased site, tree, or pest damage and provide recommendations on how losses may be minimized in the future.

Aerial surveys and ground observations in several areas will provide a better understanding of the overall impact of forest pests, relative numbers of each pest and some indication of the relationship between insects and/or diseases. An annosus root rot survey technique is being completed at VPI&SU which will provide a simple technique to estimate root infection level in thinned, high hazard plantations, and relate annosus infection to probability of attack by the SPB.

Observations are being made in all field studies to better assess the influence of bark beetle treatment activities on subsequent long term disease problems. In many cases, pre-treatment and post-treatment isolations of root pathogens are being conducted and in-plot mortality is being determined in an attempt to relate

possible disease incidence and severity to bark beetle activity or stand management practices.

Union Camp Corporation plantations in Georgia and Alabama are being thinned for salvage removal of trees heavily infected by fusiform rust. Observations are continuing on the effect of this activity on bark beetles, sublethal rust infection, and annosus root rot in the residual stand. Additional plantations on Weyerhaeuser Company lands in Mississippi are being thinned and evaluated for hazard reduction for the SPB. Vigor of individual trees is being monitored before and after thinning. The effect of wet and dry weather logging conditions on soil compaction and root damage as they relate to overall site deterioration and subsequent insect and disease infestation are also being considered.

A two-county area in Texas and a demonstration project on the Holly Springs Ranger District in Mississippi have been established to illustrate the application of current pest management technology in an operational setting. These areas will be hazard rated for SPB and annosus prior to pest occurrence. Computerized and conventional insect and disease management information will be made available directly to the field forester for making day-to-day decisions.

Natural interplay among individual insect species and disease organisms, and between these organisms and the host ecosystem, is a complex relationship which may never be fully understood. To effectively manage forest resources and hold pest losses to a minimum, we must consider these interactions to the full extent of our technical knowledge — the Program is making strides in that direction.

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